PROVISIONAL PATENT APPLICATION

DRY POWDER RETENTION KNIFE GATE VALVE

Valves designed to regulate the flow of dry powdered materials ("media") must have a minimum of internal cavities that collect media and prevent proper operation of the closure mechanism. They should also operate with a minimum of lubrication so as not to attract dirt and media and prevent proper operation of the closure mechanism. Current technology uses a "slurry valve" design where a steel gate is forced between two axially opposing elastomer members ("seats") to effect closure of the valve. The shortcoming of using a slurry valve design is that media can be pushed between the sealing members and collect in internal spaces within the valve body. This buildup eventually obstructs the gate path and prevents complete closure of the valve. To facilitate gate movement, lubrication of some sort is applied to the elastomer seats. Any powder that passes through the seats will come into direct contact with the lubricant and become contaminated.

This new design eliminates open spaces below the gate by affecting a seal around the perimeter of the gate rather than across the face. This design also operates without lubrication, thus insuring continued proper operation of the closure mechanism with no contamination risk to the media.

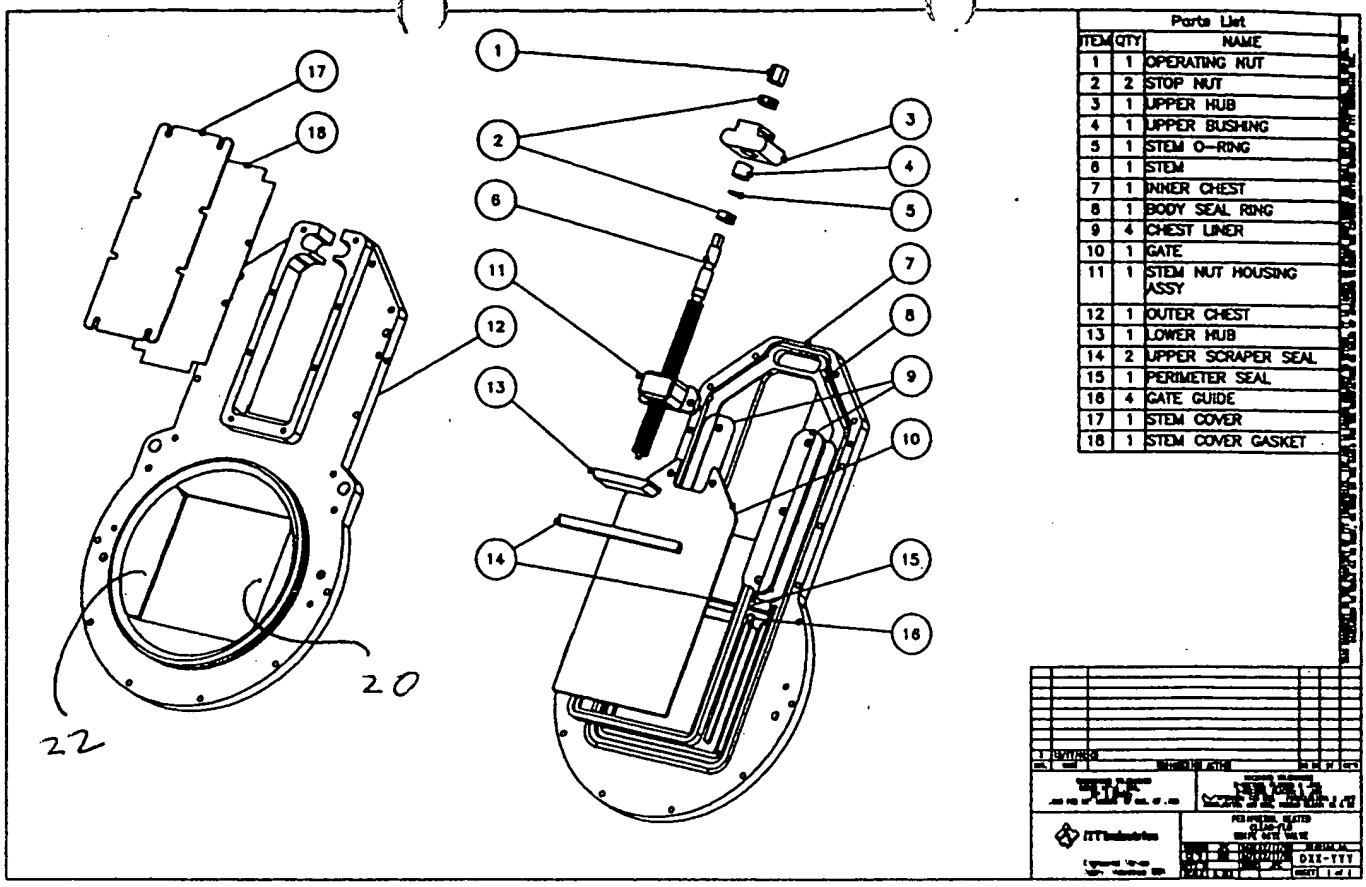
Figure 1 is an exploded assembly drawing of a knife gate valve in accordance with the invention;

Figure 2 is a front plan view of an assembled valve shown in Fig. 1;

Figure 3 is a side view of the valve shown in Fig. 2; and

Figures 4-6 are front, side and sectional views of the T-shaped seal used in the embodiment shown in Figs. 2 and 3.

This knife gate valve includes two opposing metallic bodies. The opening in the valve bodies 20 through which the media flows (the "port") is square in shape. Since the valve will normally be connected to a round flange while in operation, the complete port design incorporates a transition 22 from round to square and back to round. To close the valve, three sides of the rectangular shaped gate press against an elastomer member 24 with a T-shaped cross-section that is contained within a complementary shaped seat 26 formed by the body halves. The cross section is T-shaped to allow the body to fully retain the seal during all types of operation. The use of a perimeter seal means the gate does not have to move past the port to close the valve, thus eliminating open cavities below the closed gate that could possibly fill up with media. Since the contact area between the gate and the T-shaped perimeter seal is minimized, lubrication of the elastomer is not required. The perimeter elastomer is protected from compression set by incorporating a small opening behind the length of the seal that allows for expansion in a direction opposite the compressive force. Two transverse elastomer members on either side of the gate seal the area above the port. The gate is moved in and out of the port by following a threaded plastic stem nut that moves along a threaded rod. The use of plastic in this actuator precludes the need for lubricant in the actuating mechanism.



Parts List

ITEM	QTY	NAME
1	1	OPERATING NUT
2	2	STOP NUT
3	1	UPPER HUB
4	1	UPPER BUSHING
5	1	STEM O-RING
6	1	STEM
7	1	INNER CHEST
8	1	BODY SEAL RING
9	4	CHEST LINER
10	1	GATE
11	1	STEM NUT HOUSING ASSY
12	1	OUTER CHEST
13	1	LOWER HUB
14	2	UPPER SCRAPER SEAL
15	1	PERIMETER SEAL
16	4	GATE GUIDE
17	1	STEM COVER
18	1	STEM COVER GASKET

Fig. 1

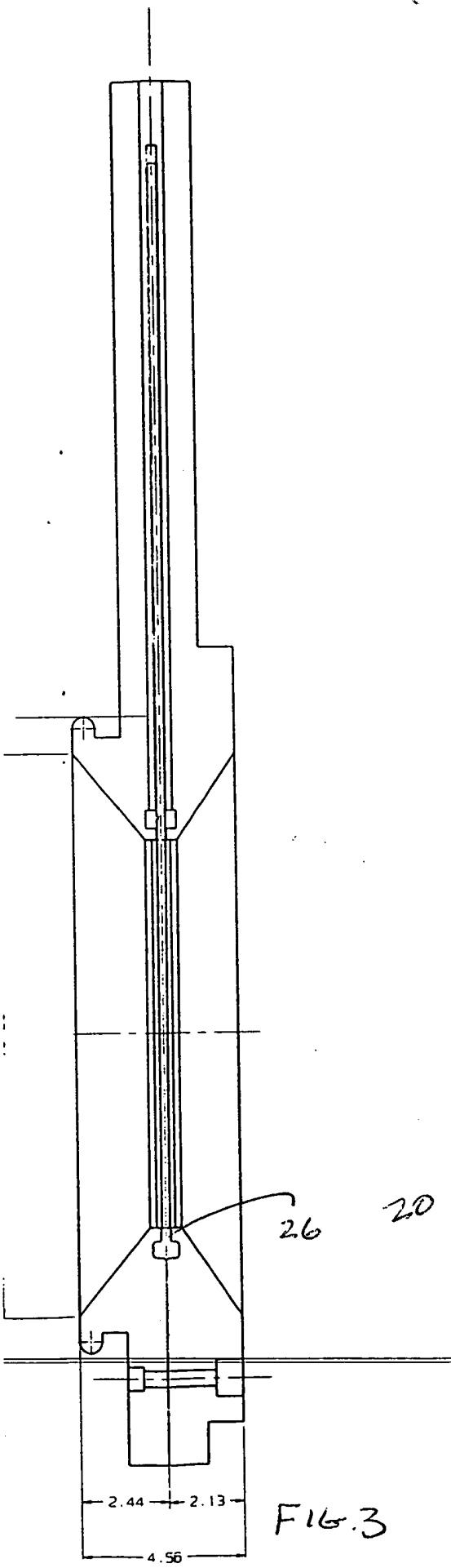


FIG. 3

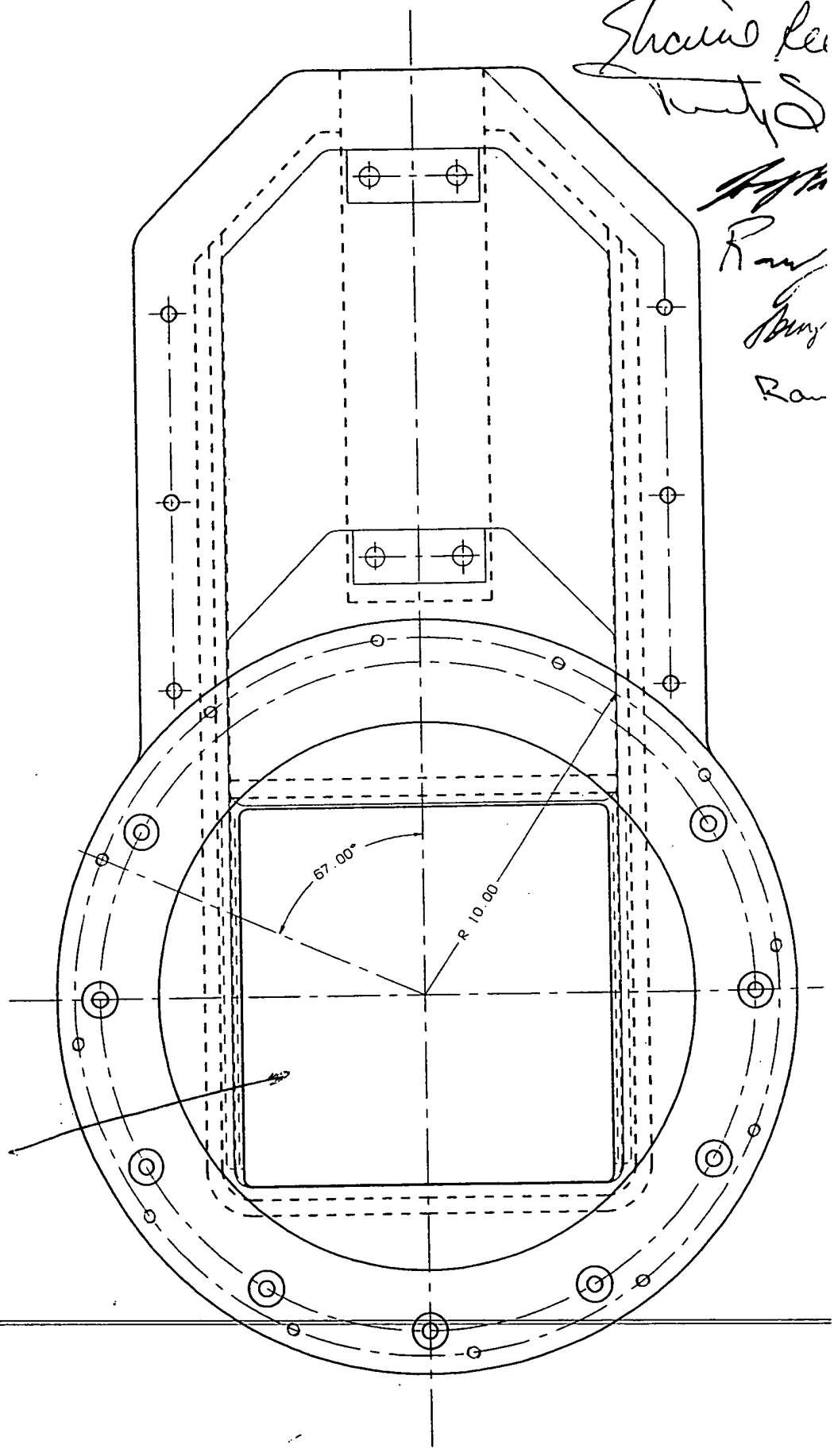


FIG. 2

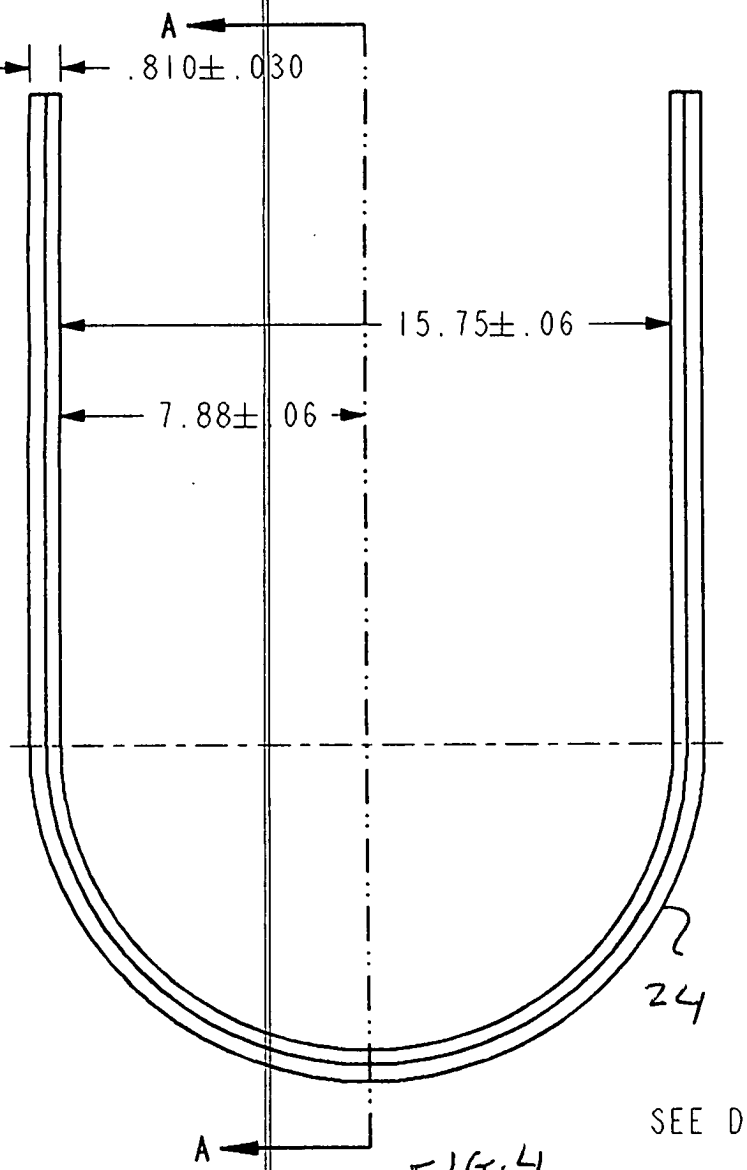


FIG.4

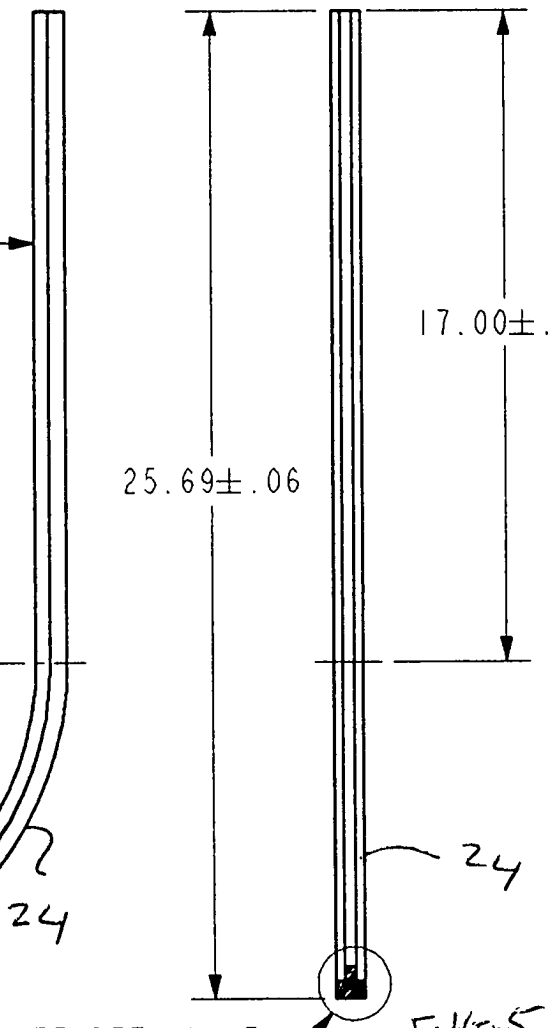
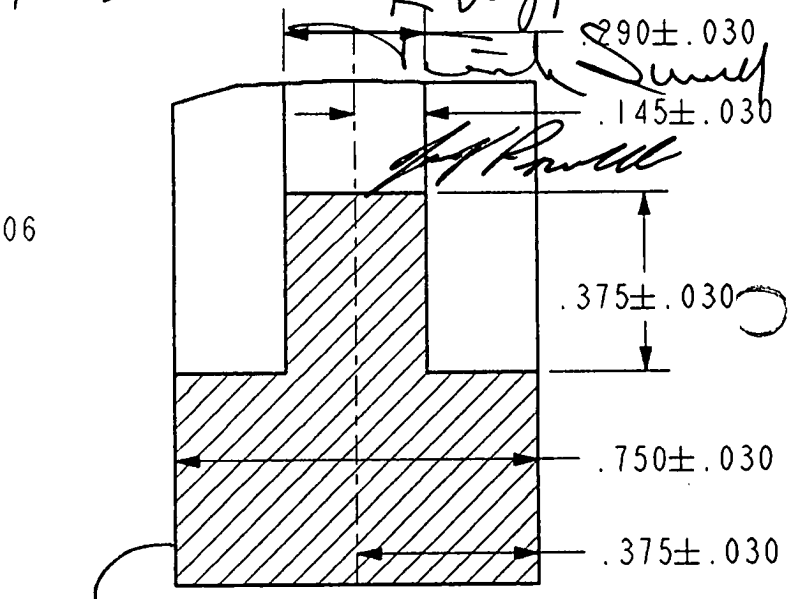


FIG.5

SECTION A-A



DETAIL B
SCALE 2.500

FIG.6

MACHINED TOLERANCES
2-DECIMAL PLACES- ±.01,
3-DECIMAL PLACES- ±.005
(✓) FINISH-125 RMS, PARALLELISM- 0.015
ANGULARITY- ±30 MIN, THREAD-CLASS 2A & 2B
UNMACHINED TOLERANCES
UNDER 12" ±.063, 12" & ABOVE .063
PER 12" LENGTH W/ MAX. OF .188

APPV'D		ENG.	
REF DWG.			

PER UNIT	U/M	ITEM NO		PART NO	DESCRIPTION

REV	DATE	ENG ACTION	EN	BY	CK
0	9/30/27	RELEASE	9164	SGR	JPC

T-SEAL 16"

TOTE VALVE | DWG. A-02-0326